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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/620,523
Filing Date: July 20, 2000
Appellant(s): NOVICH ET AL.

Mark D. Sweet
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 18, 2009 appealing from the Office action mailed September 19, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. Claims 1, 12-13, 16-20, 40, and 45-47 under 35 U.S.C. 103(a) over Papageorge in view of Nagamine.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

JP4-307787	IKETANI	1-1997
JP1-249333	NAGAMINE et al.	10-1989
WO93/24314	PAPAGEORGE et al.	12-1993

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 12-20, 40, and 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent Publication translation 4-307787 (Iketani) in view of Japanese Patent Publication translation 1-249333 (Nagamine), further in view of PCT Publication WO 93/24314 (Papageorge).

Iketani teaches a method for manufacturing a printed circuit substrate by inserting a glass cloth prepreg impregnated with a thermosetting resin varnish. See abstract. In addition Iketani teaches that the prepreg is obtained by impregnating the fiber substrate with a varnish containing a filler and then impregnating with a varnish containing no filler, per claims 1 and 40. The substrate can be glass cloths and nonwoven glass fabrics and the fillers can be inorganic non-polymeric fillers. The filler has a particle size within the instant claimed range, per claims 15 and 44. See [0006]. Also, the thermosetting varnish can be an epoxy resin, polyamide resin or a phenolic resin, wherein the preferred resin is an epoxy resin. See [0007]. Accordingly, Iketani

teaches that the glass cloth is impregnated with a "resin compatible coating" which is compatible with the matrix material, and that said "resin compatible coating" comprises a plurality of particles, as required by claims 1 and 40. While Iketani teaches that glass cloths can be used, he is silent as to the glass cloth being non-degreased and the specific particles as now claimed.

Papageorge teaches printed circuit boards comprising a laminate formed by impregnating a resin, such as epoxy into a glass cloth substrate wherein the base resin has highly thermally conductive particles incorporated therein, wherein said particles can be a nitride, carbide or graphite. See pages 4-5 and Examples. At the time the invention was made, the skilled artisan would have been reasonably motivated to modify the teachings of Iketani by using as the filler material a nitride, carbide or graphite, as taught by Papageorge in order to produce a laminate with high thermal conductivity, by incorporating filler material of high thermoconductivity, low coefficient of thermal expansion and sufficient hardness. Accordingly, the substitution of one known filler material in the production of reinforced laminates for another (known filler material) would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Nagamine is as set forth previously and teaches a laminate adapted for an electronic support wherein the laminate comprises a glass cloth impregnated with a resin such as epoxy. Nagamine teaches that the glass yarns that his glass cloth is formed from can be sized with various known sizing agents which can be used in accordance with the purpose of the glass cloth. Nagamine also discloses that a non-

desizing sizing agent, which does not require degreasing or surface treatment is known in the art, said non-desizing sizing agent eliminating the necessity of twisting, degreasing, and surface treatment and thereby significantly improving productivity and production yield.

As set forth above, Iketani teaches circuit board substrate comprising a glass cloth prepreg impregnated with a thermosetting varnish containing a filler and a varnish without a filler. Iketani is silent as to whether the glass cloth is non-degreased. Also as set forth above, Nagamine teaches that non-desized glass cloths are known in the art and provide efficacious economic properties such as improved productivity and production yield. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use as the glass cloth substrate any glass cloth substrates known in the art as being suitable for impregnation of epoxy resins when producing substrates for circuit boards such as a non-desized glass cloth as taught by Nagamine, motivated by the reasonable expectation of success of making a prepreg for a circuit board substrate and improving productivity and production yield. In addition, all of the claimed elements were known in the art, namely, sized glass cloths and non-desized glass cloths, both of which are taught to be useful in the production of laminates for electronic supports. The substitution of one known element (sized glass cloth) for another known in the art, (non-desized glass cloth) would have yielded predictable results to one of ordinary skill in the art at the time the invention was made.

As to claim 13, Papageorge teaches that the particles can be nitrides, carbides or graphite, which are the same type of particles contemplated by applicants. Accordingly,

it is the position of the examiner that the particles of the prior art have a Moh's hardness value which does not exceed the Moh's hardness value of glass fiber.

As to claims 14 and 43, Iketani teaches that the particles have a particle size within applicants' claimed range. Accordingly, it is the examiner's position that the teachings of Iketani would have provided direction to the skilled artisan for particles of the instant claimed size and thereby obviating the requirement of a particle size sufficient to allow strand wet out.

As to claims 16-17, 19-20, and 45-46, Iketani is silent as to the specific composition of the resin compatible coating; however, Iketani does teach that epoxy with fillers can be the thermosetting impregnating varnish. Nagamine teaches an epoxy resin for a use in as an impregnating varnish for glass cloth in the formation of circuit boards, said epoxy resin comprising at least one film-forming material, a resin reactive diluent comprising functional groups of the type contemplated by applicants. Note page 17. At the time of the invention thereof, it would have been obvious to the skilled artisan, to impregnate a glass cloth substrate with an epoxy resin composition containing particulate filler, as taught by Iketani, wherein the specific filler material and epoxy resin composition are selected from among those known in the art, such as those filler materials taught by Papageorge and the epoxy resin composition taught by Nagamine and as set forth by applicants, motivated by the ability to produce laminates for electronic supports that have good dimensional stability, dielectric properties and heat resistance.

Regarding claim 12, Papageorge teaches filler material that is the same type contemplated by applicants, such as graphite, nitrides and carbides. Accordingly, the examiner has reason to believe that filler material of Papageorge have a thermal conductivity within the instant claimed range, in the absence of factual evidence to the contrary.

Regarding claims 18 and 47, the reinforced laminate of the prior art is substantially similar to that of applicants. Accordingly, it is the position of the examiner that properties such as LOI and air permeability are the same as well, in the absence of factual evidence to the contrary.

Therefore, the combined teachings of Iketani, Nagamine and Papageorge would have rendered obvious the invention as claimed in present claims 1, 12-20, 40, and 43-47.

(10) Response to Argument

Appellants' arguments in the Appeal Brief of August 18, 2009 have been fully considered but are not found to be persuasive.

A. Rejection based on JP Patent Publication 4-307787 (Iketani), JP Patent Publication 1-249333 (Nagamine et al.) and WO 93/24312 (Papageorge et al.)

Argument 1: A Resin Compatible Coating which is Compatible with the Matrix Material

Appellants' Argument

Appellants argue that independent claim 1 and independent claim 40 each contain the limitation of "wherein at least a portion of the fabric has a resin compatible

coating which is compatible with the matrix material…" and that Appellants' specification teaches that, "resin compatible," means that the coating composition that is applied to the fibers is compatible with the matrix material into which the fibers will be incorporated, such that the coating composition: a) does not require removal prior to incorporation in the matrix; b) facilitates good wet out; or c) imparts desirable physical properties and hydrolytic stability. See Brief, page 11. Appellants further argue that Iketani does not teach or suggest that the varnish containing filler is "compatible" with the varnish containing no filler and that there is nothing in Iketani that teaches that the coating composition of Iketani: 1) does not require removal prior to incorporation in the matrix, 2) facilitates good wet out, or 3) imparts desirable physical properties and hydrolytic stability, and that therefore, nothing in Iketani would suggest that the varnish containing filler is "compatible" as defined in the claimed invention.

Examiner's Response

In this regard, Appellants' specification on pages 11-12 states that "the term 'resin compatible' means the coating composition applied to the glass fibers is compatible with the matrix material into which the glass fibers will be incorporated such that the coating composition (or selected coating components) achieves at least one of the following properties: does not require removal prior to incorporation into the matrix material (such as by de-greasing or de-oiling), facilitates good wet-out and wet-through of the matrix material during conventional processing and results in final composite products having desired physical properties and hydrolytic stability."

It is the examiner's position that the subject matter defined by the invention of claims 1 and 40, when read in light of the specification, embraces at least one non-degreased fabric wherein at least a portion of the fabric has a coating composition that achieves *at least one* (emphasis added) of the aforementioned properties disclosed on page 12 of the specification: 1) does not require removal prior to incorporation into the matrix material (such as by de-greasing or de-oiling), 2) facilitates good wet-out and wet-through of the matrix material during conventional processing and 3) results in final composite products having desired physical properties and hydrolytic stability. It is also the examiner's position that the language of "at least one" means that only one of the aforementioned properties needs to be present in the coating composition.

Iketani discloses a glass cloth impregnated with a resin varnish containing a filler, and then further impregnating with a varnish containing no filler. See abstract. In particular, Iketani discloses that the fibrous substrate is impregnated with the filler-containing varnish and dried to remove the solvent. In addition, Iketani discloses that a large amount of filler is introduced into the gaps in the fibrous substrate and into the regions close to the surface. A prepreg is obtained by impregnating with a varnish containing no filler. See [0011]. It is the examiner's position that the varnish containing no filler is a matrix material. The impregnating varnish containing filler is not removed from the glass cloth prior to impregnating with the varnish containing no filler (matrix material). This teaching results in a coating composition that achieves at least one of the defining properties of a "resin compatible coating" as set forth on page 12 of

Appellants' specification, namely, “does not require removal prior to incorporation into the matrix material.”

Furthermore, Iketani discloses that the thermosetting varnish can be an epoxy resin, polyamide resin, or a phenolic resin, wherein the preferred resin is an epoxy resin. See [0007]. This teaching would have provided a suggestion to the skilled artisan to use an epoxy resin as the impregnating varnish with filler material and the impregnating varnish without filler. It is the examiner's position that impregnating the glass cloth with the same resin as the impregnant with filler and impregnant without filler material would facilitate good wet-out and wet-through of the matrix material during conventional processing, thereby achieving at least one of the defining properties of a "resin compatible coating" as set forth on page 12 of Appellants' specification, i.e., "facilitates good wet-out and wet-through of the matrix material during conventional processing."

Accordingly, it is the examiner’s position that the varnish containing filler is a “resin compatible coating” as defined by page 12 of Appellants' specification.

Appellants’ Argument

Appellants argue that Nagamine and Papageorge do not cure the deficiencies of Iketani stated above, further arguing that Nagamine is silent as to whether its’ resin coating is compatible with a matrix material and that Papageorge is silent regarding the compatibility of its' resin matrix.

Examiner's Response

In this regard, it is the examiner's position that the teachings of Nagamine and Papageorge are relied upon for all that they would have reasonably conveyed to one having ordinary skill in this art at the time the invention was made. With respect to Nagamine, his teachings would have provided motivation to the skilled artisan to use as the glass cloth of Iketani, a glass cloth that is non-degreased which significantly improves productivity and production yield. With respect to Papageorge, his teachings would have provided motivation to the skilled artisan to use a nitride, carbide, or graphite filler material which would have resulted in the production of laminates with high thermal conductivity, low coefficient of thermal expansion and sufficient hardness.

It is also the examiner's position that the test for combining references is not what the individual references themselves suggest but rather what the combination of the disclosures taken as a whole would suggest to one of ordinary skill in the art. In the present case, these teachings in combination with the teachings of Iketani would have rendered obvious the invention as claimed in present claims 1 and 40.

Appellants Argument

Appellants argue that Iketani, Nagamine, and Papageorge fail to teach or suggest all the claim limitations, in particular, a resin compatible coating which is compatible with the matrix material, as in independent claims 1 and 40.

Examiner's Response

The examiner disagrees for the reasons stated above. It is the examiner's position that when taken as whole, the combined teachings of Iketani, Nagamine, and Papageorge would have rendered obvious the invention as claimed in present claims 1

and 40. It is also the examiner's position that the teachings of Iketani disclose a coating composition that achieves at least one of the disclosed properties as defined in the specification, namely, his coating does not require removal prior to incorporation into the matrix material and would facilitate good wet out and wet through of the matrix material during conventional processing condition, or more specifically, a resin compatible coating.

Argument 2: The Resin Compatible Coating Comprises a Plurality of Particles

Appellants' Argument

Appellants argue that neither Iketani or Nagamine, alone or in combination, teach the claimed resin compatible coating comprising a plurality of particles as recited in independent claims 1 and 40.

Examiner's Response

The examiner disagrees for reasons stated above in this examiner's answer and incorporated herein. Namely, it is the examiner's position that the teachings of Iketani set forth a resin compatible coating comprising a plurality of particles, as required by independent claims 1 and 40.

Appellants' Argument

Appellants argue that Iketani and Papageorge fail to teach or suggest a resin compatible coating which is compatible with a matrix material and that while Papageorge may disclose a resin containing thermally conductive particles dispersed throughout, Papageorge fails to teach or suggest a resin compatible coating comprising

a plurality of particles. Accordingly, even if one of ordinary skill in the art would combine the references as suggested by the examiner, e.g. to modify the prepreg of Iketani by using a nitride, carbide, or graphite as the filler material, as taught by Papageorge, the skilled artisan would not arrive at the claimed invention.

Examiner's Response

The examiner disagrees for reasons previously stated and incorporated herein. Agreeably Papageorge discloses a resin containing thermally conductive particles such as nitride, carbide or graphite dispersed throughout and may not teach or suggest a resin compatible coating of the type defined by appellants. Nevertheless, it is the examiner's position that the test for obviousness under 35 U.S.C. 103 is not the express suggestion of the claimed invention in any or all of the references but what the references taken collectively would suggest. *In re Conrad,* 169 USPQ 170 (CCPA 1971). In the instant case, Iketani and Papageorge are each directed to the formation of laminates for circuit boards. They each teach impregnating glass cloth with resins (such as epoxy) containing filler materials. Papageorge teaches that his cloth is saturated with resin and particles. Note page 6, lines 25-34. Accordingly, the collective teachings of the prior art clearly suggest a reinforced laminate or electronic support comprising a matrix material and at least one fabric, whereby at least a portion of the fabric has a resin compatible coating thereon, and where the resin compatible coating comprises a plurality of particles (Iketani) and wherein the particles can be selected from graphite, carbide or nitride (Papageorge) to produce laminates having high thermal conductivity, low coefficient of thermal expansion and sufficient hardness. In addition,

the teachings of Nagamine would have provided a suggestion of using a non-degreased fabric to increase production yield.

Therefore, when considered as a whole, the examiner's position remains that the combined teachings of Iketani, Nagamine, and Papageorge would have rendered obvious the invention as claimed in independent claims 1 and 40, and the claims depending therefrom.

B. Rejection based on WO 93/24312 (Papageorge et al.) and JP Patent Publication 1-249333 (Nagamine et al.)

This rejection has been withdrawn by the examiner. Accordingly, appellants' arguments are moot.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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